

IN THE CLAIMS:

Please amend Claims 1-4, 8-10, 18-23, 28, 29, and 37-39 as follows:

1. (Currently Amended) A simulator apparatus with which an operator plays a simulation ~~with virtual object(s)~~ in mixed reality space including a virtual space and real space in which a real object(s) is placed, said simulator comprising:

a viewpoint detection unit adapted to detect the ~~location/posture~~ position/orientation of a viewpoint of the operator;

an inputting unit adapted to input a real space image corresponding to the ~~location/posture~~ position/orientation of a the viewpoint of the operator;

a geometric information acquisition unit adapted to ~~recognize~~ acquire geometric information of the real object(s) placed in the real space;

a rule memory adapted to store rules for controlling the action of ~~the~~ virtual object(s);

a computation unit adapted to determine the next action of the virtual object(s) by referring to said rule memory based on a relation among the ~~location/posture~~ position/orientation of a the viewpoint of the operator, ~~location(s)~~ position(s) of the virtual object(s) and the geometric information of the real object(s); ~~and~~

a ~~presentation~~ virtual space generation unit adapted to generate ~~at least one image of the virtual object(s)~~ a virtual space image on the basis of the ~~location/posture~~ position/orientation of the virtual object(s) after the determined action and the ~~location/posture~~ position/orientation of the viewpoint ~~position~~ of the operator, ~~and to~~

represent the mixed reality space to the operator by superimposing the image(s) of the virtual object(s) on the operator's view of the real space; and

a mixed reality image generation unit adapted to generate a mixed reality space image by superimposing or overlaying the virtual space image on the real space image.

~~wherein said rules control the action of the virtual object(s) on the basis of an objective and a relative location relationship between the virtual object(s) and the real object(s) that is represented by the geometric information.~~

2. (Currently Amended) The apparatus according to claim 1, ~~wherein said presentation unit further comprises~~

wherein said inputting unit captures ~~an image-capturing unit adapted to capture real space images of said operator's view of real space images of said player's view of the real space~~[[;]],

~~an image generation unit adapted to generate mixed reality images representing the mixed reality space by superimposing or overlaying said image(s) of the virtual object(s) on said real space images; and~~

and the apparatus further comprises a video see-through type display that the operator wears wherein ~~said~~ the mixed reality images are displayed.

3. (Currently Amended) The apparatus according to claim 1, ~~wherein said presentation unit further comprises~~ comprising an optical see-through type display that the operator wears wherein said virtual ~~object image(s) are~~ space image is displayed.

4. (Currently Amended) The apparatus according to claim 1, further
~~comprising,~~ comprising:

a status detector that detects a status of the ~~operator,~~ operator,

wherein said computation unit determines a next action of the virtual object in accordance with the rule stored in said rule memory and in correspondence with the ~~location/posture~~ position/orientation of the real object and/or the status of the operator, and computes a ~~location/posture~~ position/orientation of the virtual object after the determined action.

Claims 5-7 (Canceled)

8. (Currently Amended) The apparatus according to claim 1, wherein the real object(s) include other operators who operate said simulator apparatus, and the ~~another~~ other operators share a single mixed reality space with the operator.

9. (Currently Amended) The apparatus according to claim 1, wherein the real object is an object which is fixed in position in the real space, and

said geometric information acquisition unit comprises:

a predetermined memory for pre-storing ~~location~~ position information and shape information of the real object; and

a reading unit that reads out the ~~location~~ position information and shape information of the real object from said predetermined memory as needed.

10. (Currently Amended) The apparatus according to claim 1, wherein the real object is an object which is movable but does not deform, and

said geometric information acquisition unit comprises:

a predetermined memory for pre-storing shape information of the real object;

a ~~location/posture~~ position/orientation sensor for detecting a ~~location/posture~~ position/orientation of the real object; and

a setting unit that sets a region the real object is expected to occupy in the mixed ~~real~~ reality space in accordance with the detected ~~location/posture~~ position/orientation of the real object.

Claims 11-17 (Canceled)

18. (Currently Amended) The apparatus according to claim 1, wherein said viewpoint detection unit detects a ~~location/posture~~ position/orientation of the head of the operator, and said apparatus further comprises:

a detector that detects a ~~location/posture~~ position/orientation of a hand of the operator; and

a recognition unit adapted to recognize a relative ~~location~~ position of the hand of the operator with respect to the head as a command on the basis of an output from said detector.

19. (Currently Amended) The apparatus according to claim 1, wherein said ~~presentation~~ virtual space generation unit comprises:

an alignment unit that aligns the ~~location/posture~~ position/orientation of the real object to the ~~location/posture~~ position/orientation of the virtual object after movement;

a generation unit that generates an image of the virtual object after alignment in correspondence with an occlusion relationship; and

a head-mounted display device.

20. (Currently Amended) An image processing method for a simulator apparatus with which an operator plays a game with virtual object(s) in a mixed reality space in which a real object(s) is placed, comprising:

a viewpoint detection step for detecting the ~~location/posture~~ position/orientation of a viewpoint of the operator;

an inputting step for inputting a real space image corresponding to the ~~location/posture~~ position/orientation of a the viewpoint of the operator;

a geometric information acquisition step for acquiring geometric information of the real object(s) placed in the real space;

a computation step for determining the next action of ~~the~~ virtual object(s) by referring to ~~the rule-memory~~ rules for controlling the action of the virtual object(s) based on a relation among the ~~location/posture~~ position/orientation of a the viewpoint of the operator, ~~location(s)~~ position(s) of the virtual object(s) and the geometric information of the real object(s); and

a ~~presentation~~ virtual space generation step for generating ~~at least one image of the virtual object(s)~~ a virtual space image on the basis of the ~~location/posture~~ position/orientation of the virtual object(s) after the determined action and the

~~location/posture~~ position/orientation of the viewpoint ~~position~~ of the operator, ~~and for~~
~~representing the mixed reality space to the operator by superimposing the image(s) of~~
~~virtual object(s) on the operator's view of the real space;; and~~

a mixed reality image generation step for generating a mixed reality space
image by superimposing or overlaying the virtual space image on the real space image.

~~wherein said rules control the action of the virtual object(s) on the basis of an~~
~~objective and a relative location relationship between the virtual object(s) and the real~~
~~object(s) that is represented by the geometric information.~~

21. (Currently Amended) The method according to claim 20, ~~wherein the~~
~~operator wears a video see-through type display, and said presentation step further~~
~~comprising,~~

wherein said inputting image-capturing step captures for capturing real space
images of said operator's view of the real space[[]],

~~image generation step for generating mixed reality images representing of the~~
~~mixed reality space by superimposing or overlaying said image(s) of virtual object(s) on~~
~~said real space images and for displaying said mixed reality images on the display~~

and the simulator apparatus comprises a video see-through type display that the
operator wears wherein the mixed reality images are displayed.

22. (Currently Amended) The method according claim to 20, wherein the
operator wears an optical see-through type display and ~~said presentation step representing~~

~~the mixed reality space to the operator by displaying the image(s) of virtual object(s) space~~
image is displayed on the display.

23. (Currently Amended) The method according to claim 20, further
~~comprising;~~ comprising:

a status detecting step for detecting a status of the ~~operator;~~ operator.

wherein said computation step determines a next action of the virtual object in
accordance with the rule stored in ~~said~~ a rule memory and in correspondence with the
~~location/posture~~ position/orientation of the real object and/or the status of the operator, and
~~computing~~ computes a ~~location/posture~~ position/orientation of the virtual object after the
determined action.

Claims 24-26 (Canceled)

27. (Previously Presented) The method according to claim 20, wherein the
real object(s) include other operators who operate the simulator apparatus, and wherein the
other operators share a single mixed reality space with the operator.

28. (Currently Amended) The method according to claim 20, wherein the real
object is an object which is fixed in position in the real space, and

the geometric information acquisition step includes the steps of:

pre-storing ~~location~~ position information and shape information of the real
object in a predetermined memory; and

reading out the ~~location~~ position information and shape information of the real object from the predetermined memory as needed.

29. (Currently Amended) The method according to claim 20, wherein the real object is an object which is movable but does not deform, and the geometric information acquisition step includes the steps of:

pre-storing shape information of the real object in a predetermined memory;

detecting a ~~location/posture~~ position/orientation of the real object by a ~~location/posture~~ position/orientation sensor; and

setting a region the real object is expected to occupy in the mixed ~~real~~ reality space in accordance with the detected ~~location/posture~~ position/orientation of the real object.

Claims 30-36 (Canceled)

37. (Currently Amended) The method according to claim 20, wherein the viewpoint detection step includes the step of detecting a ~~location/posture~~ position/orientation of the head of the operator, and

said method further comprises:

~~the a~~ detection step of detecting a ~~location/posture~~ position/orientation of a hand of the operator; and

~~the a~~ step of recognizing a relative ~~location~~ position of the hand of the operator with respect to the head as a command on the basis of an output in the detection step.

38. (Currently Amended) The method according to claim 20, wherein the ~~presentation~~ virtual space generation step includes the steps of:

aligning the ~~location/posture~~ position/orientation of the real object to the ~~location/posture~~ position/orientation of the virtual object after movement; and

generating an image of the virtual object after alignment in correspondence with an occlusion relationship.

39. (Currently Amended) A storage medium which stores a program of an image processing method for a simulator apparatus with which an operator plays a simulation ~~with virtual object(s)~~ in a mixed reality space including a virtual space and real space in which a real object(s) is placed, comprising:

a viewpoint detection program step for detecting the ~~location/posture~~ position/orientation of a viewpoint of the operator;

an inputting program step for inputting a real space image corresponding to the ~~location/posture~~ position/orientation of a the viewpoint of the operator;

a geometric information acquisition program step for acquiring geometric information of the real object(s) placed in the real space;

a computation program step for determining the next action of ~~the~~ virtual object(s) by referring to rules for controlling the action of the virtual object(s) based on a relation among the ~~location/posture~~ position/orientation of a the viewpoint of the operator, location(s) position(s) of the virtual object(s) and the geometric information of the real object(s); and

a presentation virtual space generation program step for generating at least one image of the virtual object a virtual space image on the basis of the location/posture position/orientation of the virtual object(s) after the action and the location/posture position/orientation of the viewpoint position of the operator, and for representing the mixed reality space to the operator by superimposing the image(s) of the virtual object(s) on the operator's view of the real space;; and

a mixed reality image generation program step for generating a mixed reality space image by superimposing or overlaying the virtual space image on the real space image.

wherein said rules control the action of the virtual object(s) on the basis of an objective and a relative location relationship between the virtual object(s) and the real object(s) that is represented by the geometric information.